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Work has focused primarily on simulations of the coastal atmosphere, and on building a coupled regional ocean-atmosphere model, based on the Naval Research Laboratory COAMPS and Rutgers/UCLA ROMS models, for use on multiple processor, cluster systems. Progress to date includes the development of a processor management code module using the Model Coupling Toolkit (MCT) (Argonne National Laboratory). The management module is able to run both COAMPS and ROMS on independent processors. Model initializations for both the ocean and atmosphere have been developed for an idealized, linear coastline, using conditions similar to summer upwelling events along the U.S. west coast.

Comparison of the coupled simulations with uncoupled and partial coupled cases suggests that the dynamics of the near shore upwelling region are greatly affected by coupled processes. For example, in cases without coupling, offshore mass transport is nearly constant across the coastal shelf. Coupling generates a more realistic mass transport results that gradually increases over a distance of 10-20 km off shore. Near shore currents are also affected with the coastal jet decreasing near the coast where the wind stress is reduced.

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Title: COAMPS Simulations of the Coastal Atmosphere

Work has focused primarily on simulations of the coastal atmosphere, and on building a coupled regional ocean-atmosphere model, based on the Naval Research Laboratory COAMPS and Rutgers/UCLA ROMS models, for use on multiple processor, cluster systems. Progress to date includes the development of a processor management code module using the Model Coupling Toolkit (MCT) (Argonne National Laboratory). The management module is able to run both COAMPS and ROMS on independent processors. Model initializations for both the ocean and atmosphere have been developed for an idealized, linear coastline, using conditions similar to summer upwelling events along the U.S. west coast.

Results from our experiments focus mostly on idealized upwelling case for examining the coupled response of the upwelling system and providing a test for the coupled COAMPS/ROMS model that is under development. For these studies, we have chosen a simple channel domain with a linear coast line, no topography on land, a constant ocean shelf slope, and periodic conditions in the north-south direction. Our coupled simulations examine how changes in the SST forced by upwelling wind conditions affect the lower atmospheric boundary layer and surface stress. We find that cooling of the atmosphere by upwelled water causes a decoupled boundary layer structure. The net effect is a reduction in the wind stress by about a factor of 2 within 10 km of the coast, with an accompanying increase in the wind stress curl.

Comparison of the coupled simulations with uncoupled and partial coupled cases suggests that the dynamics of the near shore upwelling region are greatly affected by coupled processes. For example, in cases without coupling, offshore mass transport is nearly constant across the coastal shelf. Coupling generates a more realistic mass transport results that gradually increases over a distance of 10-20 km off shore. Near shore currents are also affected with the coastal jet decreasing near the coast where the wind stress is reduced.

LIST OF PUBLICATIONS

Perlin, N., R. M. Samelson, and D. B. Chelton, 2004. Scatterometer and model wind and wind stress in the Oregon-California coastal zone. Monthly Weather Review, 132, 2110-2129.

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